Adopted by reference in
K.A.R. 5-6-13

KANSAS DEPARTMENT OF AGRICULTURE
DIVISION OF WATER RESOURCES
TOPEKA, KANSAS

SPECIFICATIONS FOR WATER LEVEL MEASUREMENT TUBE NOVEMBER 5, 1999

I. GENERAL

The Kansas Water Appropriation Act, K.S.A. 82a-706c, provides the Chief Engineer, Division of Water Resources, Kansas Department of Agriculture (Chief Engineer), with the authority to require any water user to install meters, gauges or other measuring devices, which he or she, or his or her agents may read at anytime, and to require any user to report the reading of such meters, gauges, or measuring devices at reasonable intervals.

The purpose of these specifications is to define methods of measurement and applications which are acceptable to the Chief Engineer. Other good workable methods may be acceptable to the Chief Engineer; however, any proposed methods which differ from those indicated herein shall first be submitted for review and approval by the Chief Engineer before construction begins.

II. APPLICATION OF METHODS

The methods of providing a water level measurement tube are:

1. Water level measurement tube adjacent to the production well casing.
2. Separate observation well within 25 feet of the production well.
3. Air line tube inside the production well casing.
4. Electronic water level measurement sensor.
5. Other site-specific methods authorized by the Chief Engineer.

These methods are described in section III. Depending on the type of application, some methods are not allowed.

A. Public Water Supply (PWS)Wells

All public water supply wells, which provide groundwater to the public for human consumption, where the delivery system has at least ten service connections or regularly serves an average of at least 25

individuals daily at least 60 days out of the year, shall not use the method of placing a water level measurement tube adjacent to the well casing. All other methods listed above are acceptable.

B. All Wells Penetrating Aquifers Having Total Dissolved Solid (TDS) Levels in Excess of 1,000 Milligrams per liter (Mg/L).

All wells penetrating the Mississipian, Arbuckle, and any other formations that contain water with TDS levels in excess of 1,000 Mg/L, shall only use an air line tube inside the well casing or other site-specific methods authorized by the Chief Engineer.

C. All Non-PWS Wells Penetrating Aquifers Having Total Dissolved Solid (TDS) Levels Less than 1,000 Mg/L.

All non-public water supply wells completed in aquifers containing water of useable quality, including those to be used for industrial and irrigation purposes, may use any of the methods described above.

III. METHODS OF MEASUREMENT

A. Water Level Measurement Tube Adjacent to the Well Casing. (Diagram A)

A water level measurement tube adjacent to a well casing shall have a minimum nominal diameter of one inch and shall be installed in the annular space outside the well casing. If thermoplastic pipe is used, it shall be Standard Dimension Ratio (SDR) 21 or better. The tube shall extend from a minimum of 12 inches above the ground surface to the bottom of the well casing, unless written approval is received from the Chief Engineer for a different length tube. The installed tube must be capable of passing a 3/8-inch steel tape down to the depth of the production well.

The bottom end of the tube shall be closed with a cap of like material. A vented cap of like material shall be installed at the top of the tube to prevent foreign material from entering the tube.

Unless otherwise specified by the Chief Engineer, the bottom 10 feet of tube shall be either well screen or perforated pipe. In the event that a well is developed in more than one aquifer, special guidelines for the installation of the water level measurement tube shall be obtained from the Chief Engineer.

All material referred to above shall be selected and installed in accordance with Section IV of these specifications dealing with ACCEPTABLE MATERIALS AND INSTALLATION TECHNIQUES.

The tube need not be welded or attached to the well casing, but proper care must be exercised during installation to prevent damage to the tube. In deep wells, pipe guides may be welded below each joint of well casing and aligned to form a straight vertical support for the tube.

B. Separate Observation Well Near Production Well (Diagram B)

An observation well shall be constructed within 25 feet of the production well with a minimum nominal casing inside diameter of two inches to allow water samples to be obtained. This observation well shall be installed and screened at the same depth and producing zone of the aquifer as the adjacent production well, using the construction regulations described in K.A.R. 28-30-6.

The bottom end of the observation well casing shall be closed with a cap of like material. A vented, removable cap of like material shall be installed at the top of the observation well casing to prevent foreign material from entering the observation well.

If thermoplastic water well casing is selected, it must be SDR 21, or better.

Unless otherwise specified by the Chief Engineer, the bottom 10 feet of pipe shall be either well screen or perforated pipe. In the event that a well is developed in more than one aquifer, special guidelines for the installation of observation well shall be obtained from the Chief Engineer prior to construction of the observation well.

C. Air Line Tube Inside Well Casing (Diagram C)

The air line method measures depth to water by determining the air pressure required to push water out of a submerged tube of known length. The air line tube shall be constructed of corrosion-resistant materials and pass through the pump base inside the well casing in a manner that will provide for a watertight seal between the pipe and the pump base. The lower end of the tube shall terminate with an open end at least 5 feet above the pump intake to avoid turbulence, but always below the lowest possible pumping level. The upper end of the tube shall be fitted with suitable connections for an air gauge, valve and air pump. The actual installed length of air line shall be indicated on a metal plate in the immediate vicinity of the air line, often on the dial of the gauge. The pump installer shall take particular care to insure that: (l) A metal plate is installed on, or in the immediate vicinity of, the production well which indicates current actual installed length from the center of the gage to the bottom of the air line. Any changes in the length of the air line shall be so indicated on the metal plate. (2) The air line shall be installed in such a manner that it will be operable at all times.

D. Electronic Water Level Measurement Sensor.

An electronic measurement sensor may be installed in the well to monitor the water level in the well. The sensor must be a solid state pressure transducer housed in a fully submersible, protective housing connected to a readout device on the ground surface through a waterproof cable.
The readout device shall be calibrated to read depth to water in feet below the land surface.

The transducer shall be pressure and temperature rated for the conditions under which it will be installed and shall be accurate to within plus or minus one percent.

The water level sensor shall be installed by attaching it to a bracket outside of the casing at the level of the lowest perforation in the well. The waterproof connecting cable may be strapped to the casing at selected intervals or installed in a conduit along the outside of the casing. As an alternative, the sensor may be lowered into the well inside the casing by means of the cable and secured at the surface. In either case, the depth of the sensor below the surface must be recorded and clearly shown at the location of the readout device hook-up. A single readout device may be used for more than one well if it can be easily calibrated for each well.

IV. ACCEPTABLE MATERIALS AND INSTALLATION TECHNIQUES FOR WATER LEVEL MEASUREMENT TUBES AND OBSERVATION WELLS

A. All thermoplastic pipe and connectors used to construct a water level measurement tube shall be of sufficient strength and durability to perform adequately for the life of the production well.

B. All steel pipe and connectors used to construct a water level measurement tube shall be of sufficient strength and durability to perform adequately for the life of the production well.

C. Well screen - The slot size of well screen shall be carefully selected to effectively allow the entry of water and to prevent the entry of sand from the aquifer. Where plastic pipe is used, the well screen shall be fabricated from SDR 2l or better. The maximum screen slot width shall not exceed 1/8 inch, nor shall there be more than six inches vertical distance between slots, unless otherwise authorized by the Chief Engineer.

D. All pipe ends shall be reamed to full pipe size to avoid snagging of tapes or other measurement devices. PVC pipe shall be assembled in accordance with the manufacturer's instructions. Wrought iron or wrought steel pipe shall be assembled by tightening into threaded malleable iron couplings taking care to cover all threads with a protective coat during assembly.

E. Observation well development - The observation well shall be developed by the driller to ensure the observation well is hydraulically connected to all the source aquifers of the production well.

F. The observation well shall be marked for easy visibility. The observation well casing shall extend at least one foot above land surface and be covered with a sanitary well seal.

G. If necessary, a protective barrier shall be constructed to protect the observation well from damage. The opening to the measurement tube or observation well shall be covered by a sanitary well seal.

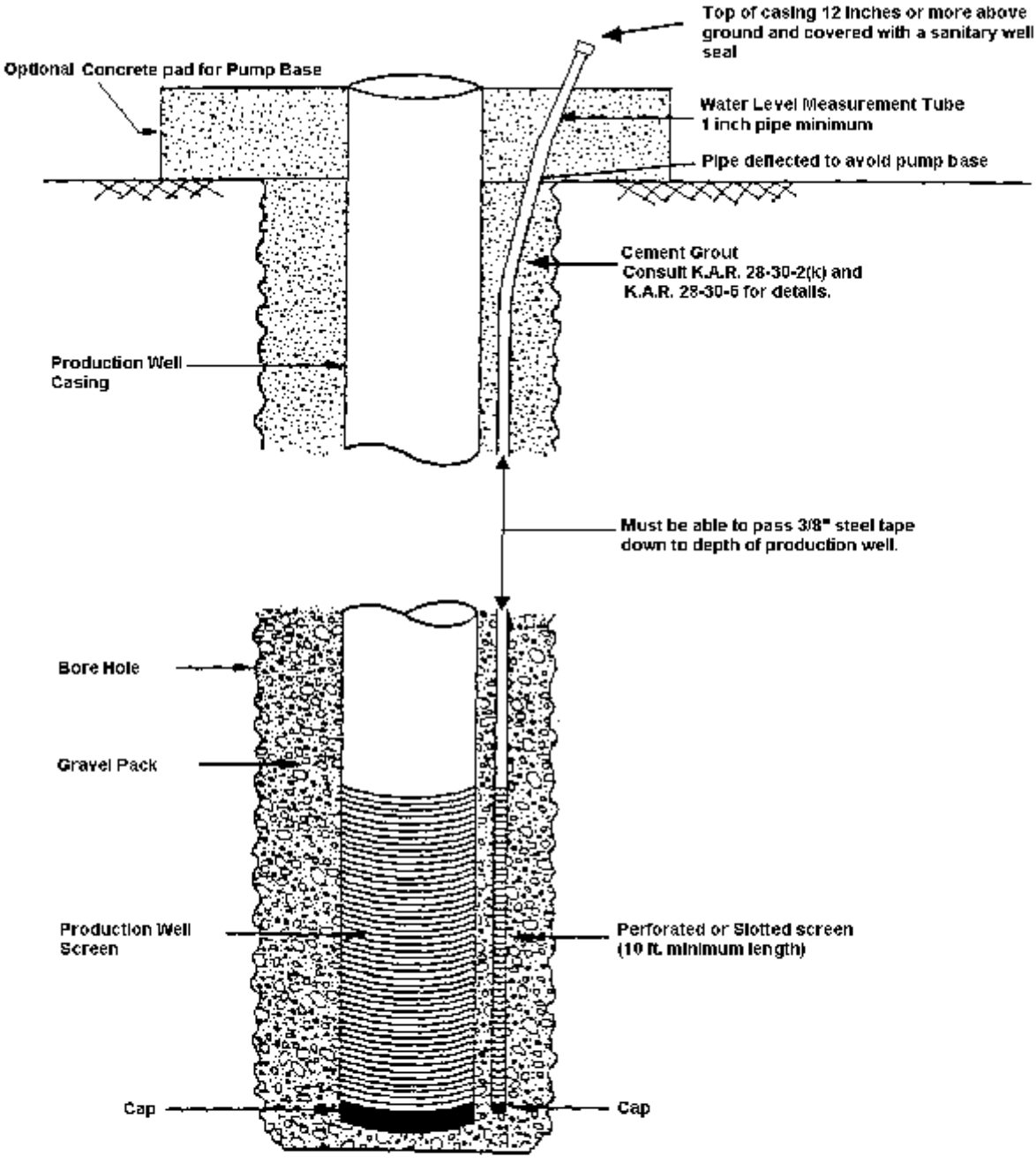
H. The following guidelines are provided regarding depth limitations for thermoplastic type casing installations.

Plastic Pipe Rating	Depth Limitation Feet
SDR 21	150
SDR 17	350
SCH 40	500

Schedule 40 steel casing or better must be used for that portion of the casing installed at depths in excess of 500 feet.

V. THIS SUPERCEDES THE SPECIFICATIONS FOR WATER LEVEL MEASUREMENT TUBES ADOPTED BY THE CHIEF ENGINEER, DATED SEPTEMBER 17, 1986.

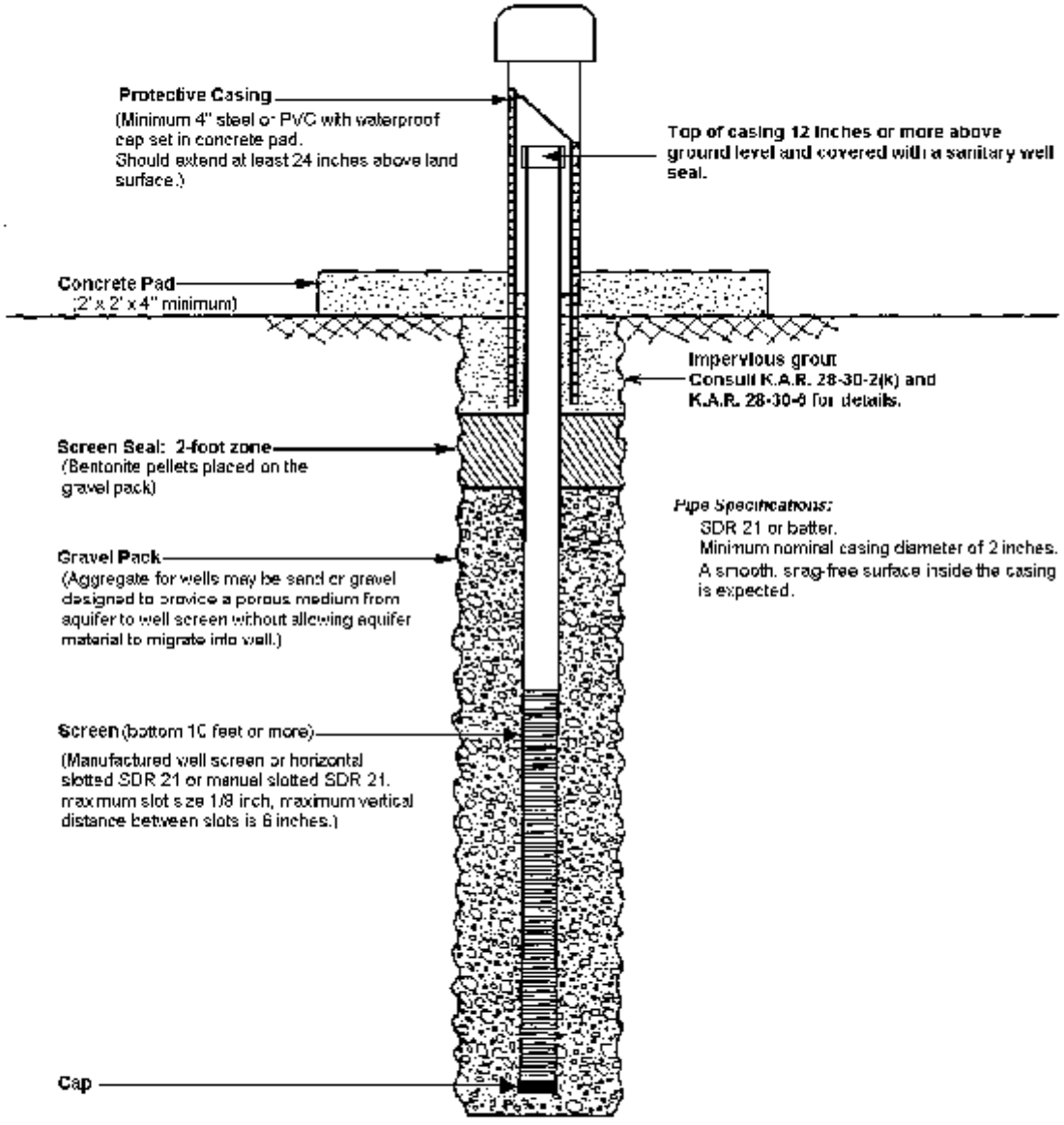
Adopted at Topeka, Kansas, this 5th day of November, 1999.



Water Level Measurement Tube Installed Adjacent to the Well Casing

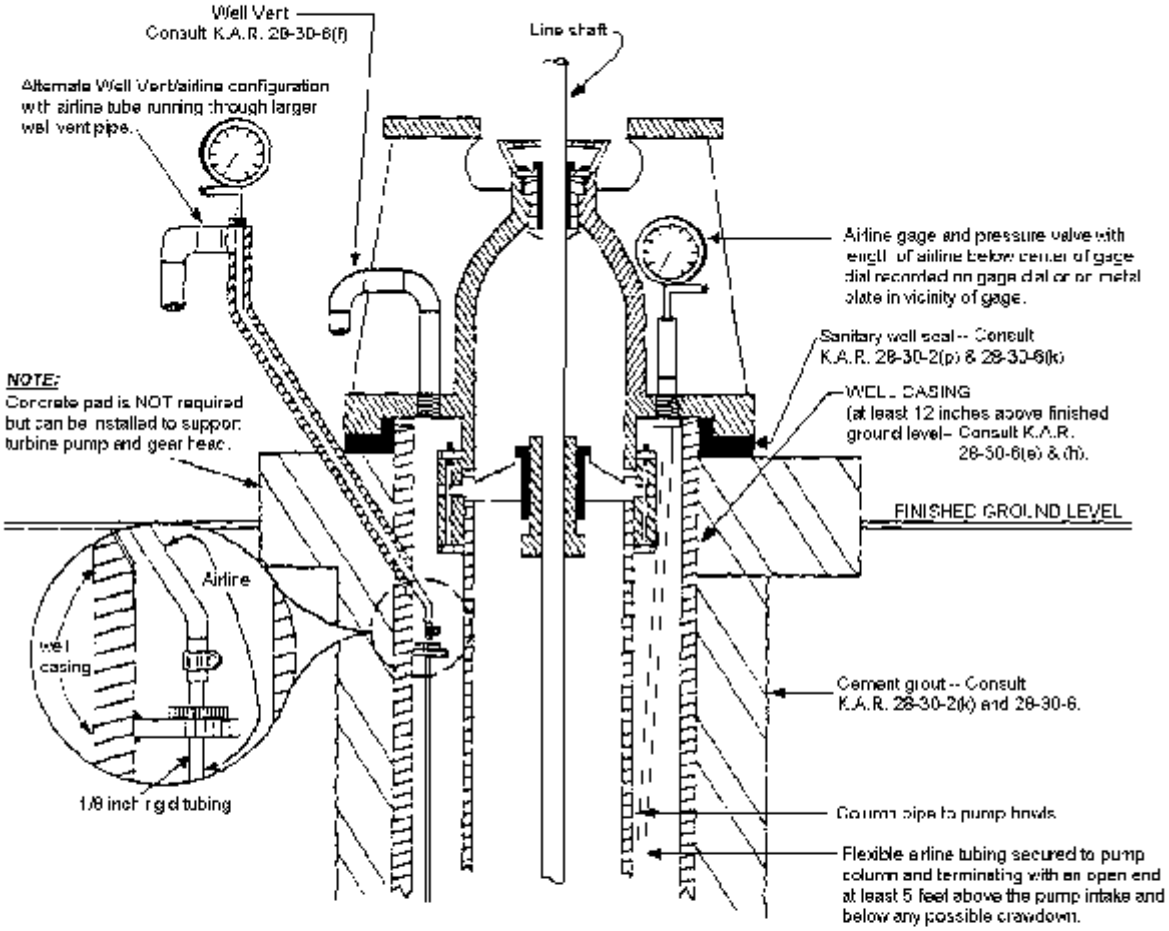
(This method not approved for use with Public Water Supply Wells)

DIAGRAM "A"



Separate Observation Well Design

Diagram "B"



Airline tube installed inside a public water supply well.

DIAGRAM "C"